



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/595,402	11/25/2008	Darrell H. Reneker	UOA.474.US	8684
26360 7590 10/26/2011 RENNER KENNER GREIVE BOBAK TAYLOR & WEBER FIRST NATIONAL TOWER, SUITE 400 106 SOUTH MAIN STREET AKRON, OH 44308-1412				
EXAMINER				
SYKES, ALTREV C				
ART UNIT		PAPER NUMBER		
1786				
MAIL DATE		DELIVERY MODE		
10/26/2011		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

10/595,402

**Applicant(s)**

RENEKER ET AL.

**Examiner**

ALTREV SYKES

**Art Unit**

1786

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 September 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 5) ☒ Claim(s) 1-32 is/are pending in the application.
- 5a) Of the above claim(s) 11-32 is/are withdrawn from consideration.
- 6) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 7) ☒ Claim(s) 1-10 is/are rejected.
- 8) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☒ The drawing(s) filed on 14 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-CB00)  
Paper No(s)/Mail Date 20060626
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_

## DETAILED ACTION

### *Election/Restrictions*

1. Claims 11-32 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on September 27, 2011.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 2, 4 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Tennent et al. (US 6,432,866).

Regarding claims 1 and 10, Tennent et al. discloses a composition of matter which comprises carbon nanofibers. (See Col 3, lines 57-59) Tennent et al. discloses causing the nanofibers to form bonds or become glued with other nanofibers at the fiber intersections. (See Col 4, lines 39-45) Examiner notes that since applicant has not defined in the claims that the claimed fiber is of any particular dimensions, the nanofibers taught by Tennent et al. meet the claim limitation for a fiber. Support for this position can also be found in applicant's specification where the instant invention is described as being directed to hierarchical structures having carbon nanotubes attached to carbon nanofibers.

(See [0036] of the published specification) Tennent et al. discloses the nanofibers within the structure can be in the form of discrete fibers or aggregate particles of nanofibers.

(See Col 4, lines 47-48) Tennent et al. discloses the term “nanofibers” includes “bucky tubes” and “nanotubes”. (See Col 6, lines 1-6) As such, examiner notes that nanofibers and nanotubes can be used interchangeably in the invention of Tennent.

Therefore, Tennent anticipates a composition comprising a first nanotube attached to a fiber and additionally a second nanotube attached to the first nanotube since Tennent et al. discloses a composition of matter in which nanofibers form bonds or become glued with other nanofibers (or nanotubes). (See Col 4, lines 39-45)

Regarding claim 2, Tennent et al. discloses the nanotube having very small diameters. (See Col 6, lines 43-45) Tennent et al. discloses the diameter may be less than 0.1 microns (or 100 nm). (See Col 6, lines 49-52)

Regarding claim 4, examiner notes that one of ordinary skill in the art would appreciate that nanotubes are categorized as either single-walled or multi-walled. While Tennent et al. is not explicit to a particular category, one of ordinary skill in the art would understand that the nanotube would inherently have to be either single-walled or multi-walled.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:
- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:
1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
6. Claims 3 and 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tennent et al. (US 6,432,866) in view of Chen et al. (US 6,346,136).

Regarding claim 3, Tennent et al. discloses all of the claim limitations as set forth above but the reference does not specifically disclose the length of the nanotube ranging from about 10 to about 10,000 nanometers (or 0.01 micron to 10 micron).

Chen et al. discloses both carbon nanotubes and nanofibers can reach several microns in length but only a few to tens of nanometers in diameter. (See Col 3, lines 34-36)

Examiner notes that the phrase “several microns” would readily suggest those nanotubes having lengths in the range claimed by applicant.

As Tennent et al. and Chen et al. are both directed to nanomaterials, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize a nanotube having a length ranging from about 10 to about 10,000 nanometers as claimed by applicant for the nanotubes as disclosed by Tennent since such would have been conventional to the nanotube art as taught by Chen. (See Col 3, lines 34-36)

Regarding claims 5 and 6, Tennent et al. discloses all of the claim limitations as set forth above but the reference does not specifically disclose the nanotube comprises a metal.

Chen et al. discloses using carbon nanotubes or carbon nanofibers as templates for the syntheses of metal nanoparticles and fibers. (See Abstract and Col 2, lines 13-16) Chen et al. discloses preferably the metals are transition metals such as Cu, Pd and/or Pt as well as Ag and/or Au. (See Col 3, lines 38-39) Chen et al. discloses metal nanoparticles are widely used in catalysis, electrical and optical devices and coatings, etc. (See Col 1, lines 10-15)

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to include a metal as taught by Chen et al. with the nanotube as disclosed by

Tennent motivated by the desire to provide metal nanoparticles for use in catalysis, electrical and optical devices and coatings, etc. (See Col 1, lines 10-15)

7. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tennent et al. (US 6,432,866) in view of Dzenis et al. (US 6,265,333).

Regarding claims 7-9, Tennent et al. discloses all of the claim limitations as set forth above but the reference is not explicit to an electrospun fiber or a ceramic fiber.

Dzenis et al. discloses a fiber reinforced composite material comprising primary reinforcement fibers and secondary smaller diameter reinforcement fibers. (See Abstract) Dzenis et al. discloses the secondary reinforcement fibers may be any of the fibers listed as being useful as primary reinforcement fibers. The primary reinforcement fibers may include boron carbide, boron nitride, and ceramic fibers. (See Col 5, lines 10-17, 30-32 and Col 7, lines 15-17) Dzenis et al. discloses the secondary reinforcement fibers may be fibers of submicron diameters termed nanofibers. These small diameter fibers may include small carbon fibers produced by electrospinning. (See Col 8, lines 5-17) Dzenis et al. discloses electrospinning typically produces fibers having a diameter of about 5 to about 5000nm, although fibers with diameters as small as three nanometers have been produced by this method. (See Col 8, lines 18-40) As such, examiner notes that using electrospinning to produce nanofibers would have been well within the ordinary skill of one in the art at the time of the invention.

As Tennent et al. and Dzenis et al. are both directed to compositions of matter comprising nanotubes, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize electrospinning to produce the nanofibers as taught by Tennent since such would have been conventional in the art of producing small diameter fibers. Further, it would have been obvious to one of ordinary skill in the art at the time of the invention to produce the nanofibers of Tennent et al. using the ceramic fiber materials as taught by Dzenis since Dzenis teaches that ceramic materials are suitable. (See Col 8, lines 33-40 and Col 5, lines 10-17, 30-32 and Col 7, lines 15-17)

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

***Conclusion***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALTREV SYKES whose telephone number is (571)270-3162. The examiner can normally be reached on Monday-Thursday, 8AM-5PM EST, alt Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer Chriss can be reached on 571-272-7783. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Elizabeth M. Cole/  
Primary Examiner, Art Unit 1798

/ACS/  
Examiner  
10/19/11